Let's Go Fly a Kite! - AERODYNAMICS

Abstract

Kites have been a source of entertainment for centuries of kids from cultures around the world. In this experiment you will have a chance to build your very own kite, a simple sled kite. Then you will use it to investigate how kites fly. Will you find out the best way to fly your kite?

Objective

In this experiment you will make a simple sled kite to use in a series of experiments to test different variables important for flight.

Introduction

Did you know that one of the most famous kite flyers of all time was a 10 year-old boy? His name was Homan Walsh, and with out him the Niagara Falls Bridge would not have been built in 1847. Before building of the bridge could begin, someone needed to get a line from one side of the gorge to the other. Homan successfully flew a kite from one side of the gorge to the other, and his kite line was the first to span the gorge. After securing Homan's initial kite string, heavier and heavier line was fed across until a steel cable could be connected across the gorge so that bridge construction could begin. Homan Walsh was rewarded with a ten-dollar cash prize, which was a lot of money in 1847!

Another famous kite flying duo were the Wright Brothers. Before building the first successful airplanes, they experimented with various designs by using kites. By making many different kite models of their airplanes, they eventually came up with a design that worked, and the rest is history.

There are many different kite designs. Some kite designs are very old, like traditional Chinese and Japanese kites. Some designs are very new, like the dynamic stunt kites used in sport kite flying competitions. These kites are made with modern materials and designs which make them ultra maneuverable. There are a few basic styles used for kite building:

Basic kite designs.

Here are some basic kite designs (Image from Benson, T., 2006).

In this experiment you will make your own kite for testing how different variables affect flight. The type of kite you will make is called a sled kite, and is very simple to build. After you build the kite you will use it for a series of experiments, testing different variables such as speed, line length, tail length, and any other variable you want to test. Will you be able to figure out the best way to fly a kite?

Terms, Concepts and Questions to Start Background Research

To do this type of experiment you should know what the following terms mean. Have an adult help you search the internet, or take you to your local library to find out more!

\* sled kite

\* flight

\* variable

\* rating scale

Questions

\* How do you make a kite?

\* What variables effect the flight of a kite?

\* What is the best way to fly a kite?

Materials and Equipment

\* computer

\* printer

\* paper

\* tape

\* string

\* drinking straws

\* scissors

\* hole punch

\* paper clip

\* crayons and markers

\* meter stick (metric ruler)

Experimental Procedure

1. Download the Sled Kite Template and print it out on a sheet of 8 1/2" x 11" paper:

2. Carefully cut out the sled kite and decorate using crayons, markers, or other media.

3. Trim the length of the two drinking straws so they will fit in the area marked for the straws.

4. Tape the straws into place.

5. Place two or three pieces of tape in the marked areas covering the black circles to reinforce the holes for the string.

6. Using a single-hole paper puncher, carefully punch the two holes marked by the black circles.

7. Cut two pieces of kite string 45 cm each. Tie a string through each hole. Tie them tight, but not so tight that you tear the paper.

8. Tie the opposite end of both strings together to a paper clip.

9. Cut a 1 m long piece of string. Tie one end of this string to the other end of the paper clip. Your sled kite is ready to fly!

10. Outside in a clear area, use your kite to test some variables:

\* Having a Tail - add on a tail or two to compare (no tail, one tail, two tails)

\* Tail Length - try tails of different lengths (10 cm, 100 cm, 500 cm)

\* Flier Speed - fly the kite in three different ways (standing, walking, and running)

\* String Length - use different lengths of string to attach to the paper clip (1 m, 3 m, 5 m)

11. Use a scale to rate the quality of flight under each different condition. For example, a scale of 0-10 where 0 is no flight and 10 is the best flight.

12. Make data tables to record your results. Here are two examples:

Variable: Flier Speed Standing Walking Running

Result:

Variable: Tail Length 10 cm 100 cm 500 cm

Result:

13. Which variables make your kite fly best?

Variations

\* You can use the online kite flight simulator from NASA to test the variables of kite flight virtually. You can go directly to NASA's kite simulator page with this link: http://www.grc.nasa.gov/WWW/K-12/airplane/kiteprog.html

\* You can also use the flight simulator to design a kite before you build it. Check out the Science Buddies experiment, The Wright Stuff: Using Kites to Study Aerodynamics